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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*
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**WO 01/67752 A2**

(54) Title: METHOD AND APPARATUS FOR DISPLAYING TELEVISION PROGRAM RECOMMENDATIONS

(57) Abstract: A method and apparatus are disclosed for displaying available television programs with an indication of the recommendation score assigned to each program by a television programming recommender. A television programming recommender evaluates each of the programs in an electronic programming guide (EPG) in a conventional manner to identify programs of interest to a particular user. An indication of the numerical recommendation scores associated with each program are also displayed to the user, for example, using program grids listing the available television programs. The numerical recommendation scores can be displayed with each program directly or can be mapped onto a color spectrum or another visual cue, such as a variable size-of-text or rate of blinking, that permits the user to quickly locate programs of interest. Television channels can be sorted in the program grid according to a normalized recommendation score for the time period being examined.

## Method and apparatus for displaying television program recommendations

### **Field of the Invention**

The present invention relates to television program recommenders, and more particularly, to a method and apparatus for displaying television program recommendations.

### 5 **Background of the Invention**

As the number of channels available to television viewers has increased, along with the diversity of the programming content available on such channels, it has become increasingly challenging for television viewers to identify television programs of interest. Historically, television viewers identified television programs of interest by analyzing printed television program guides. Typically, such printed television program guides contained grids listing the available television programs by time and date, channel and title. As the number of television programs has increased, it has become increasingly difficult to effectively identify desirable television programs using such printed guides.

15 More recently, television program guides have become available in an electronic format, often referred to as electronic program guides (EPGs). Like printed television program guides, EPGs contain grids listing the available television programs by time and date, channel and title. Some EPGs, however, allow television viewers to sort or search the available television programs in accordance with personalized preferences. In addition, EPGs allow for on-screen presentation of the available television programs.

20 While EPGs allow viewers to identify desirable programs more efficiently than conventional printed guides, they suffer from a number of limitations, which if overcome, could further enhance the ability of viewers to identify desirable programs. For example, many viewers have a particular preference towards, or bias against, certain categories of programming, such as action-based programs or sports programming. Thus, the viewer preferences can be applied to the EPG to obtain a set of recommended programs that may be of interest to a particular viewer.

25 Thus, a number of tools have been proposed or suggested for recommending television programming. The Tivo™ system, for example, commercially available from Tivo, Inc., of Sunnyvale, California, allows viewers to rate shows using a Thumbs Up and Thumbs

Down" feature and thereby indicate programs that the viewer likes and dislikes, respectively. Thereafter, the TiVo receiver matches the recorded viewer preferences with received program data, such as an EPG, to make recommendations tailored to each viewer.

Thus, such tools for recommending television programming provide selections of programs that a viewer might like. Even with the aid of such program recommenders, however, it is still difficult for a viewer to identify programs of interest from among all the options. A need therefore exists for a method and apparatus for displaying television program recommendations in a more efficient manner. A further need exists for a method and apparatus for displaying television program recommendations for a large number of shows in a manner that permits a user to efficiently process the recommendations to identify the best shows of interest.

### **Summary of the Invention**

Generally, a method and apparatus are disclosed for displaying available television programs with an indication of the recommendation score assigned to each program by a television programming recommender. The program and corresponding recommendation score information can be presented to the user, for example, using grids listing the available television programs by time and date, channel and title.

According to a feature of the invention, the numerical recommendation scores associated with each program are also displayed to the user. The numerical recommendation scores can be displayed with each program directly or can be mapped onto a color spectrum or another visual cue, such as a variable size-of-text or rate of blinking, that permits the user to quickly locate programs of interest. The visual cues are then applied to each program in the program grid in accordance with the present invention.

The present invention can also sort the television channels in the program grid according to a normalized recommendation score for the time period being examined. For a given half-hour time interval, the program grid can be sorted directly by recommendation score, such that programs with the highest score appear on the top of the program grid listing. Likewise, for time intervals larger than a half hour, a normalized score can be assigned to each channel for the time period of interest and the program grid can then be sorted by the normalized score, such that channels with the highest normalized score for the time period of interest appear on the top of the program grid listing.

A more complete understanding of the present invention, as well as further features and advantages of the present invention, will be obtained by reference to the following detailed description and drawings.

## 5 **Brief Description of the Drawings**

FIG. 1 illustrates a television programming recommender in accordance with the present invention;

FIG. 2 illustrates a sample table from the program database of FIG. 1;

FIG. 3 is a flow chart describing an exemplary display recommendation process embodying principles of the present invention;

FIG. 4A is a sample table from the electronic program guide in accordance with one embodiment of the invention;

FIG. 4B is a sample table from the electronic program guide in accordance with a second embodiment of the invention; and

FIG. 4C is a sample table from the electronic program guide in accordance with a third embodiment of the invention.

## **Detailed Description**

FIG. 1 illustrates a television programming recommender 100 in accordance with the present invention. As shown in FIG. 1, the television programming recommender 100 evaluates each of the programs in an electronic programming guide (EPG) 110 to identify programs of interest to a particular user. The set of recommended programs can be presented to the user using a set-top terminal/television 150, for example, using well known on-screen presentation techniques.

According to one feature of the present invention, the available programs are displayed together with an indication of the recommendation score assigned to each program by the television programming recommender 100. The programs can be presented, for example, using grids listing the available television programs by time and date, channel and title. In further variations the numerical scores can be mapped onto a color spectrum or another visual cue, such as size-of-text or rate of blinking, that permits the user to quickly locate programs of interest. In yet another variation, the numerical score can be mapped onto a variable brightness scale (gray scale). These visual cues can then be applied to each program in the program grid.

For example, in an implementation where the television programming recommender 100 assigns a score between 0 and 100 to each program, the recommendation score assigned to each program can be mapped to a color spectrum or a size-of-text visual cue in the following manner:

RECOMMENDER SCORE	COLOR	FONT SIZE/ THUMBUP-DOWN
0-15	DARK RED	10 / ↓
16-30	RED	10 / ↓
31-45	LIGHT RED	10 / ↓
46-55	YELLOW	12 / ⇒
56-70	LIGHT GREEN	14 / ↑
71-85	GREEN	16 / ↑
86-100	DARK GREEN	18 / ↑

5

In a further variation of the present invention, the television channels can be sorted in the program grid according to a normalized recommendation score for the time period being examined. For example, for a given half-hour time interval, the program grid can be sorted directly by recommendation score, such that programs with the highest score appear on the top of the program grid listing. Likewise, for time intervals larger than a half hour, a normalized score can be assigned to each channel for the time period of interest and the program grid can then be sorted by the normalized score, such that channels with the highest normalized score for the time period of interest appear on the top of the program grid listing.

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As shown in FIG. 1, the television programming recommender 100 contains a program database 200, discussed further below in conjunction with FIG. 2, and a display recommendation process 300, discussed further below in conjunction with FIG. 3. Generally, the program database 200 records information for each program that is available in a given time interval. The display recommendation process 300 displays the available programs together with an indication of the recommendation score assigned to each program by the television programming recommender 100.

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The television programming recommender 100 may be embodied as any television program recommender 110, such as the Tivo™ system, commercially available from Tivo, Inc., of Sunnyvale, California, or the television program recommenders 110

described in United States Patent Application Serial No. \_\_\_\_\_, filed \_\_\_\_\_, entitled  
“Method and Apparatus for Recommending Television Programming Using Decision Trees,”  
(Attorney Docket No. 700772) and United States Patent Application Serial No. \_\_\_\_\_,  
filed \_\_\_\_\_, entitled “Bayesian TV Show Recommender,”

5

(Attorney Docket No. 700690), as modified herein to carry out the features and functions of  
the present invention.

FIG. 2 is a sample table from the program database 200 of FIG. 1 that records  
information for each program that is available in a given time interval. As shown in FIG. 2,  
the program database 200 contains a plurality of records, such as records 205 through 220,  
each associated with a given program. For each program, the program database 200 indicates  
the date/time and channel associated with the program in fields 240 and 245, respectively. In  
addition, the title and genre for each program are identified in fields 250 and 255. Additional  
well-known attributes (not shown), such as actors, duration, and description of the program,  
can also be included in the program database 200.

In accordance with one feature of the present invention, the program database  
200 also records an indication of the recommendation score assigned to each program by the  
television programming recommender 100 in field 270. In this manner, the numerical scores  
can be displayed to the user in the electronic program guide with each program directly or  
mapped onto a color spectrum or another visual cue that permits the user to quickly locate  
programs of interest.

FIG. 3 is a flow chart describing an exemplary display recommendation  
process 300 embodying principles of the present invention. As shown in FIG. 3, the display  
recommendation process 300 initially obtains the electronic program guide (EPG) 110 during  
step 310 for the time period of interest. Thereafter, the display recommendation process 300  
obtains the recommendation score from the recommender 100 for each available program in  
time period of interest during step 320. The display recommendation process 300 then maps  
the recommendation score to a desired visual cue, such as color or size-of-text, during step  
330. Finally, the display recommendation process 300 displays the modified program grid to  
the user during step 340 with each available program displayed together with the  
recommendation score or the desired visual cue. The user can thereafter interact with the  
modified program grid using known techniques, for example, to select programs,  
automatically record programs or to program warnings that will automatically notify the user  
when a particular program is being presented.

FIG. 4A is a sample table from the electronic program guide 400 in accordance with a first embodiment of the invention. Specifically, the embodiment of FIG. 4A presents each program together with the recommendation score directly. Thus, a user can review the electronic program guide 400 and quickly identify the programs having the highest score.

FIG. 4B is a sample table from the electronic program guide 400 in accordance with a second embodiment of the invention. Specifically, the embodiment of FIG. 4B presents each program together with a numerical mapping of the recommendation score onto a color scheme, in the manner described above. It is noted that for a color mapping implementation, a range of scores can be discretely mapped to a given color, as discussed above, or a score can be mapped to a color in a continuous fashion. Thus, a user can review the electronic program guide 400 and quickly identify the programs with dark green, associated with the mostly strongly recommended programs.

FIG. 4C is a sample table from the electronic program guide 400 in accordance with a third embodiment of the invention. Specifically, the embodiment of FIG. 4C presents each program together with a numerical mapping of the recommendation score onto a size-of-text scheme, in the manner described above. Thus, a user can review the electronic program guide 400 and quickly identify the programs with a thumbs up symbol (⬆) and printed with the largest font.

As previously indicated, a further variation of the invention allows the television channels to be sorted in the program grid according to a normalized recommendation score for the time period being examined. For example, for a given half-hour time interval, the program grid can be sorted directly by recommendation score, such that programs with the highest score appear on the top of the program grid listing. Likewise, for time intervals larger than a half hour, a normalized score can be assigned to each channel for the time period of interest and the program grid can then be sorted by the normalized score, such that channels with the highest normalized score for the time period of interest appear on the top of the program grid listing.

In one illustrative implementation, a normalized score for a channel can be computed in the following manner. First, the scores  $s_1, s_2, \dots, s_n$  (where  $0 \leq s_i \leq 100$ ) of all the shows to be shown on the channel in a given time period are obtained. Thereafter, each score  $s_i$  is adjusted by a weighting factor  $w_i$ . The normalized score for the channel is the sum of these adjusted weights  $w_1*s_1 + w_2*s_2 + \dots + w_n*s_n$ . The weighting factor can be found as follows. If  $s_i$  is  $> 95$ , then  $w_i = 100$ ; if  $s_i$  is less than 95 but greater than 50, then  $w_i = 10$ . If  $s_i$

is less than or equal to 50, then  $w_i = 1$ . The effect is to give a heavy weight to highly recommended shows and a smaller weight to not so highly recommended shows (and unit weight to neutral and not recommended shows). Channels with more recommended shows will get higher normalized scores. Of course, variations on this normalization scheme exist, as would be readily apparent to one of ordinary skill in the art.

It is to be understood that the embodiments and variations shown and described herein are merely illustrative of the principles of this invention and that various modifications may be implemented by those skilled in the art without departing from the scope and spirit of the invention.

## CLAIMS:

What is claimed is:

1. A method for displaying available television programs, comprising the steps  
of:  
5 obtaining a list of available programs (110);  
obtaining a recommendation score for each of said available programs (110);  
and  
displaying said list of available programs (110) to a user with an indication of  
said recommendation score.  
10
2. The method of claim 1, wherein said indication of said recommendation score  
provides said recommendation score directly.
3. The method of claim 1, wherein said indication of said recommendation score  
15 maps said recommendation score onto a color scheme.
4. The method of claim 3, wherein said color scheme discretely maps said score  
to a color.
- 20 5. The method of claim 3, wherein said color scheme continuously maps said  
score to a color.
6. The method of claim 1, wherein said indication of said recommendation score  
maps said recommendation score onto a variable size-of-text scheme.  
25
7. The method of claim 1, wherein said indication of said recommendation score  
maps said recommendation score onto a variable rate-of-flicker scheme.

8. The method of claim 1, wherein said indication of said recommendation score maps said recommendation score onto a variable brightness scheme.

9. A method as claimed in claim 1, further comprising a step of:

5 sorting said list of available programs (110) based on said recommendation score to generate a sorted list of available programs; and  
displaying said sorted list of available programs.

10. The method of claim 9, wherein said displaying step displays said sorted list of  
10 available programs (110) together with an indication of said recommendation score.

11. A method as claimed in claim 1, each of said available programs (110) being presented on at least one of a plurality of program channels;  
comprising the steps of: calculating a normalized recommendation score for  
15 each of said program channels;  
sorting said list of program channels based on said normalized recommendation score; and  
displaying said available programs according to said normalized recommendation score of their respective channels.

20

12. The method of claim 11, wherein said normalized recommendation score for each of said program channels, NS, is obtained as follows:

$$NS = w_1 * s_1 + w_2 * s_2 + \dots + w_n * s_n,$$

where  $s_n$  and  $w_n$ , correspond to a score and a weighting factor for each show, n, to be shown  
25 on said channel in said given time interval.

13. A system (100) for displaying available television programs, comprising:  
a memory for storing computer readable code; and  
a processor operatively coupled to said memory,  
30 said processor configured to:  
obtain a list of available programs (110);  
obtain a recommendation score for each of said  
available programs (110); and

display said list of available programs (110) to a user with an indication of said recommendation score.

14. A system (100) as claimed in claim 13, said processor being configured to  
5 sort said list of available programs based on said recommendation score to generate a sorted list of available programs.

15. A system (100) as claimed in claim 13, each of said available programs (110) being presented on at least one of a plurality of program channels, said processor being  
10 configured to:  
calculate a normalized recommendation score for each of said program channels;  
sort said list of program channels based on said normalized recommendation score; and  
15 display said available programs according to said normalized recommendation score of their respective channels.

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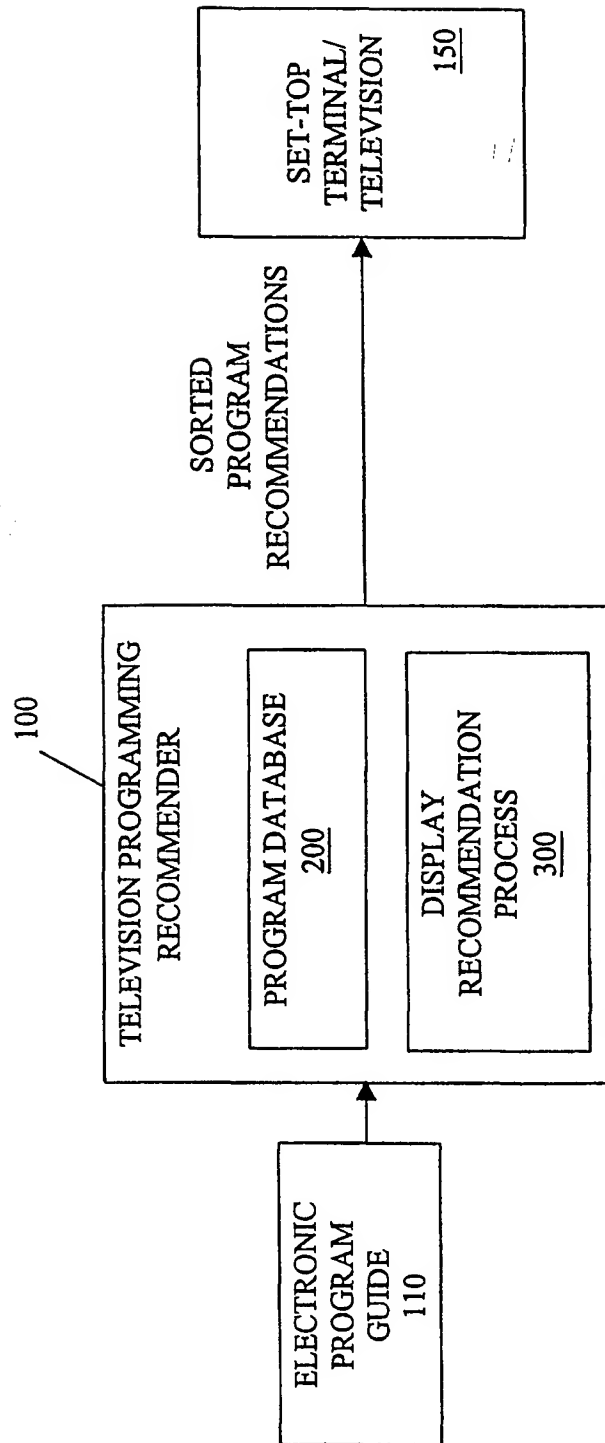


FIG. 1

PROGRAM DATABASE - 200

DATE/TIME	CHANNEL	TITLE	GENRE	...	RECOMMENDER SCORE
11/18/99 -- 8:00 P.M.	CH 1	LUCY	COMEDY		55
11/18/99 -- 8:30 P.M.	CH 1	AL'S FAMILY	SITCOM		78
...					
11/18/99 -- 9:00 P.M.	CH 3	YOUR HOUSE	DRAMA		96

205

210

220

FIG. 2

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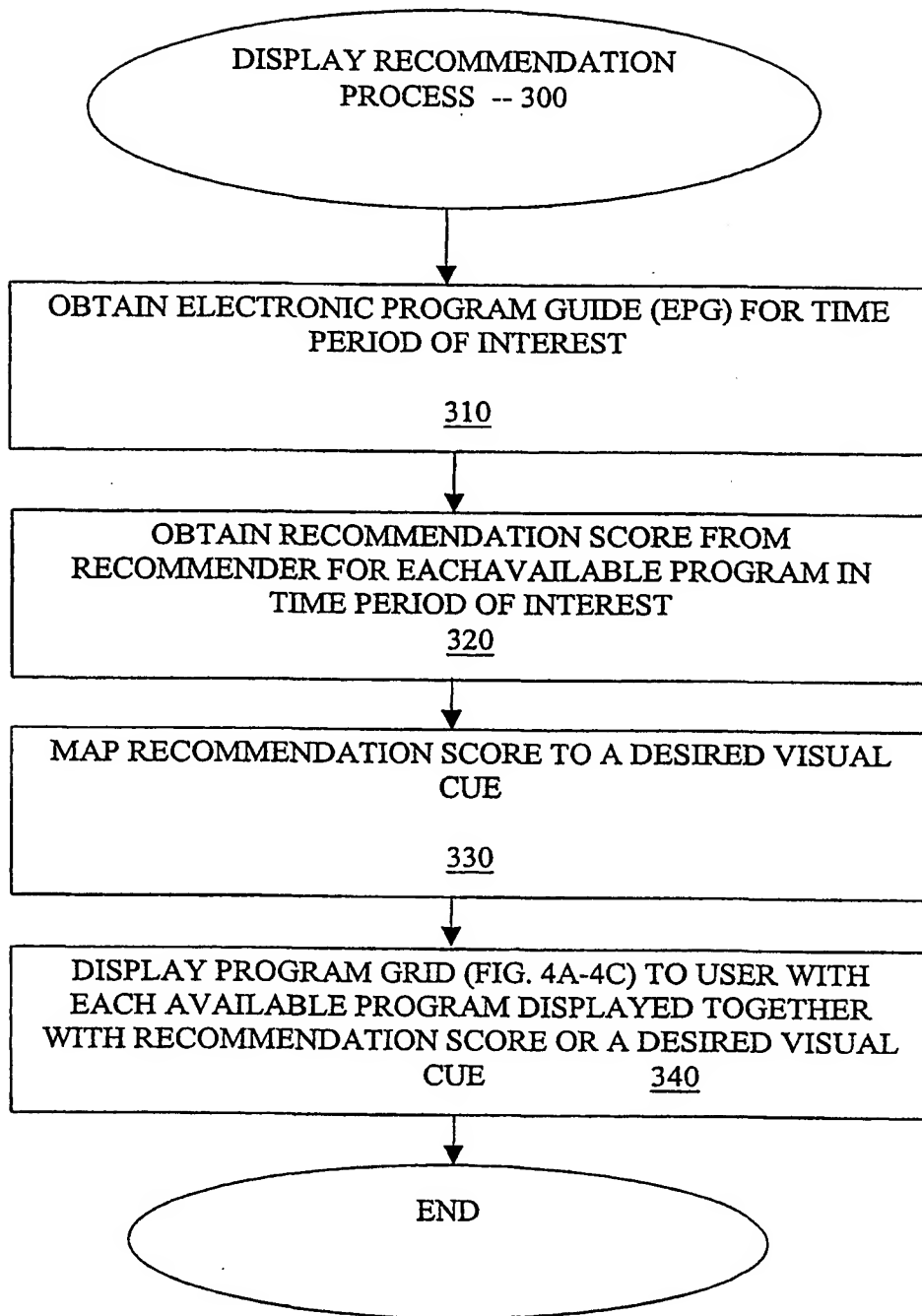


FIG. 3

ELECTRONIC PROGRAM GUIDE -- 400  
(WITH SCORE)

EPG FOR THURSDAY, NOV. 18, 1999 FROM 8 P.M. UNTIL 11 P.M.						
	8:00	8:30	9:00	9:30	10:00	10:30
CH 1	LUCY <score=55>	AL'S FAMILY <score=78>		STAR VOYAGER <score=23>	CH 1 NEWS <score=62>	
CH 2	BASEBALL TODAY <score=23>	INSIDE SPORTS <score=14>		HOCKEY <score=10>		
CH 3	TONIGHT <score=52>	FAMILY TIME <score=30>	YOUR HOUSE <score=96>	EVENING NEWS <score=69>	HOSPITAL DRAMA <score=88>	
...						
CH 99	WORLD NEWS <score=70>		LOCAL NEWS <score=60>		NEWSSTAND <score=65>	

FIG. 4A

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ELECTRONIC PROGRAM GUIDE -- 400  
(COLOR CODED)

EPG FOR THURSDAY, NOV. 18, 1999 FROM 8 P.M. UNTIL 11 P.M.						
	8:00	8:30	9:00	9:30	10:00	10:30
CH 1	LUCY <yellow>	AL'S FAMILY <green>		STAR VOYAGER <red>	CH 1 NEWS <light green>	
CH 2	BASEBALL TODAY <red>		INSIDE SPORTS <dark red>		HOCKEY <dark red>	
CH 3	TONIGHT <yellow>	FAMILY TIME <red>	YOUR HOUSE <dark green>	EVENING NEWS <light green>	HOSPITAL DRAMA <dark green>	
...						
CH 99	WORLD NEWS <light green>		LOCAL NEWS <light green>		NEWSSTAND <light green>	

FIG. 4B

ELECTRONIC PROGRAM GUIDE -- 400  
(SIZE OF TEXT)

EPG FOR THURSDAY, NOV. 18, 1999 FROM 8 P.M. UNTIL 11 P.M.					
	8:00	8:30	9:00	9:30	10:00
CH 1	LUCY -- => <yellow>	AL'S FAMILY -- ↑ <green>		STAR VOYAGER -- ↓ <red>	CH 1 NEWS -- ↑ <light green>
CH 2	BASEBALL TODAY -- ↓ <red>	INSIDE SPORTS -- ↓ <dark red>		HOCKEY -- ↓ <dark red>	
CH 3	TONIGHT -- => <yellow>	FAMILY TIME -- ↓ <red>	YOUR HOUSE -- ↑ <dark green>	EVENING NEWS -- ↑ <light green>	HOSPITAL DRAMA -- ↑ <dark green>
...					
CH 99	WORLD NEWS -- ↑. <light green>	LOCAL NEWS -- ↑ <light green>		NEWSSTAND -- ↑ <light green>	

FIG. 4C

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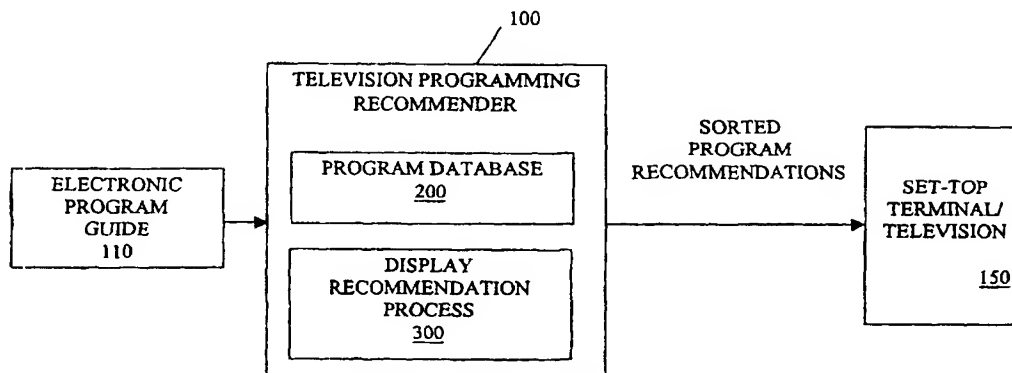
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## INTERNATIONAL SEARCH REPORT

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PCT/EP 01/02268

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04N5/445 H04N5/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 790 935 A (PAYTON DAVID W) 4 August 1998 (1998-08-04)	1,2, 9-11, 13-15
Y	column 4, line 8 -column 10, line 25 ----	12
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A	EP 0 854 645 A (TEXAS INSTRUMENTS INC) 22 July 1998 (1998-07-22) column 3, line 33 -column 21, line 53 ----	1-15
A	US 5 867 799 A (LANG ANDREW K ET AL) 2 February 1999 (1999-02-02) column 6, line 66 -column 32 -----	1-15



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents :

\*A\* document defining the general state of the art which is not considered to be of particular relevance

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\*O\* document referring to an oral disclosure, use, exhibition or other means

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\*Y\* document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

27 August 2001

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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